Emergent paramagnetic phases in Zn-paratacamite(Topological Aspects of Solid State Physics)

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DAY 5: 9:00 – 9:40

Emergent paramagnetic phases in Zn-paratacamite

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Recently, there has been much experimental progress in the search for new quantum paramagnetic phases of matter though successful fabrication of frustrated spin 1/2 magnets. In this talk, I will focus on one such material: a quasi-two-dimensional family of layered spin 1/2 kagome lattice systems $Zn_xCu_{4-x}(OH)_6Cl_2$ dubbed "Zn-paratacamite". Remarkably, at x=1 this material shows no sign of magnetic order down to the lowest temperatures studied. It is therefore considered one of the leading candidate systems for hosting a quantum spin liquid phase. In the undoped x=0 limit, two thermodynamic phase transitions are observed and the new phases are the subject of this talk. I will argue that the lowest temperature phase has Neel order induced by a frustration relieving structural distortion observed in this doping regime. By quantum disordering this Neel phase, I will argue that the intermediate temperature paramagnetic phase is a valence-bond-solid. Lastly, I will present predictions for future X-ray and inelastic neutron scattering experiments which can test our theory.

DAY 5: 9:40 – 10:20

Multi-channel Kondo Models in non-Abelian Quantum Hall Droplets

Gregory Fiete
Caltech

We study the coupling between a quantum dot and the edge of a non-Abelian fractional quantum Hall state which is spatially separated from it by an integer quantum Hall state. Near a resonance, the physics at energy scales below the level spacing of the edge states of the dot is governed by a k-channel Kondo model when the quantum Hall state is a Read-Rezayi state at filling fraction $\nu = 2 + k/(k+2)$ or its particle-hole conjugate at $\nu = 2 + 2/(k+2)$. The k-channel Kondo model is channel isotropic even without fine tuning in the former state; in the latter, it is generically channel anisotropic. In the special case of $k = 2$, our results provide a new venue, realized in a mesoscopic context, to distinguish between the Pfaffian and anti-Pfaffian states at filling fraction $\nu = 5/2$.